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THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

This paper contains an application relating to a question of zoological nomenclature which has been submitted to the International Commission on Zoological Nomenclature for decision. As a preliminary, this paper has been published in the " Bulletin of Zoological Nomenclature ". The volume in which this paper was so published and the date of publication are shown at the foot of the first page of the paper.

2. The object of publishing applications in the " Bulletin of Zoological Nomenclature " is to provide an opportunity to interested specialists to submit comments to the Commission on the action recommended in the applications so published. For this purpose an interval of six months from the date of publication is allowed to elapse before the International Commission starts to vote on any given application.

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4. Recipients of separates of papers published in the " Bulletin " are therefore particularly requested to furnish their comments on the action proposed as soon as possible to the Assistant Secretary, the International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, London, S.W.7, England.

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CULEX AEGYPTI LINNAEUS, 1762 (INSECTA, DIPTERA); PROPOSED VALIDATION AND INTERPRETATION UNDER THE PLENARY POWERS OF THE SPECIES SO NAMED. Z.N.(S.) 1216

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The purpose of the present application is to ask the International Commission on Zoological Nomenclature to use its plenary powers to such extent as may be necessary to provide a valid basis for the continued use of the name *Culex aegypti* Linnaeus, 1762, for the Yellow Fever Mosquito. Two problems are involved, for the foregoing name was published in a work which has been rejected by the International Commission for the purposes of zoological nomenclature and, as there seems no reasonable doubt, was applied by Linnaeus to an entirely different species. These questions are discussed separately in the following paragraphs.

2. The name *Culex aegypti* Linnaeus was published in 1762 in the work by Hasselquist entitled *Reise nach Palästina*, a German translation of a work by Hasselquist which had been published in 1757 under the title *Iter Palaestinum*. In the *Iter Palaestinum* Hasselquist employed in a number of cases Latin binomial names supplied to him by Linnaeus, but, as these names were published before the starting point of zoological nomenclature they are not available for use in zoological nomenclature as from the above work. The same names appeared in the German translation published in 1762 and owing to their binominal form and the fact that they were published after the starting point of zoological nomenclature some of these names, including the name with which we are here concerned, later came into use.

3. The *Reise nach Palästina* was no more than a direct translation of the pre-1758 *Iter Palaestinum* and until the early years of the present century it was a matter of doubt whether names published after 1757 in such a translation acquired the status of availability by reason of being so republished. This matter was set at rest in 1910 (*Smithson. Publ.* 1938 : 6) by the Ruling given by the International Commission in its Opinion 5 that a name published in a translation of the kind discussed above did not acquire availability unless "reinforced by adoption or acceptance by the author publishing the reprint". The question whether the names in the German (1762) translation of Hasselquist's book satisfied the test laid down in Opinion 5 formed the subject of a Ruling given by the Commission in Opinion 57, which was published in 1914 (*Smithson. Publ.* 2256 : 131-134). In that Opinion the Commission ruled that the author who published the German translation of Hasselquist's book (i.e. T. H. Gadebusch) had not himself reinforced by adoption or acceptance the names published in the original edition of 1757, having done no more than publish without comment a translation of that book. The Commission accordingly ruled that the German translation of 1762, like the original of

1757, was unavailable for nomenclatorial purposes. Recently, under a General Directive given to it by the Fourteenth International Congress of Zoology, Copenhagen, 1953, when establishing the Official Index of Rejected and Invalid Works in Zoological Nomenclature the International Commission carried out a review of the Opinions rendered prior to the above Congress and placed on the above Official Index the titles of all works that had so far been rejected for nomenclatorial purposes. In the Direction embodying the decisions so taken, Direction 32 (published in 1956, *Ops. Decl. int. Comm. zool. Nomencl.* 1 (C) : 307-308) the titles of the *Iter Palaestinum* of 1757 and of the *Reise nach Palästina* of 1762 were placed on the Official Index of Rejected and Invalid Works with the title numbers 35 and 36 respectively.

4. From the particulars given above it will be seen that the first step needed to give effect to the application now submitted will be for the Commission to use its plenary powers to validate the specific name *aegypti* Linnaeus, 1762, as published in the combination *Culex aegypti* on page 470 of the German translation of Hasselquist's *Iter Palaestinum* published by Gadebusch under the title *Reise nach Palästina*. Such action would be in complete harmony with the expressed wish of the International Congresses of Zoology that the Commission should use its plenary powers for the purpose of validating well-known names published in works rejected for nomenclatorial purposes (1950, *Bull. zool. Nomencl.* 4 : 65), on the basis of which the Commission has, for example in its Opinions 441 and 442, recently validated certain important generic names in the Order Diptera (e.g. *Stomoxys*, *Stratiomys*, etc.) as published in 1762 in Geoffroy's *Histoire abrégée*, a work rejected for nomenclatorial purposes as one in which the author had not applied the principles of binomial nomenclature, by the Ruling given in Opinion 228.

5. We must now turn to the second part of our application, namely the need for securing an authoritative interpretation of the nominal species *Culex aegypti* Linnaeus, 1762, in a sense consistent with current usage. For many years this name was lost in the literature and the Yellow Fever Mosquito was known by the name *Culex fasciatus* Fabricius, 1805 (*Syst. Antiat.* : 36). The first author to employ the specific name *aegypti* Linnaeus in its current connotation was Dyar (H. G.) (1920, *Insecutor Inscit. menst.* 8 : 204). Dyar's identification of this species was not immediately accepted without challenge, but for many years now it has been in general use having appeared in hundreds of papers in applied entomology and in medical literature. Its abandonment at this date would cause the greatest confusion and would give rise to strong opposition, especially in medical quarters.

6. One of the present applicants (Mattingly, 1957, *Ann. trop. Med. Parasit.* 51 : 392) has recently re-examined in detail the description given by Linnaeus (in Hasselquist) for *Culex aegypti* and has come to the conclusion that the name does not apply to the Yellow Fever Mosquito, being clearly applicable to *Culex caspius* Pallas, 1771 (*Reise Prov. Russl.* 1 : 475), a species now placed in the subgenus *Ochlerotatus* Lynch Arribalzaga, 1891. The other applicants (Stone and Knight) are in full agreement with the conclusions reached by Mattingly in this matter. The foregoing identification of *Culex aegypti* Linnaeus was first made by Gough (1914, *Bull. ent. Res.* 5 : 133) who had personal experience

of the small number of mosquitoes occurring in Egypt. It was strongly argued by Patton (1933, *Ann. trop. Med. Parasit.* : 182) on the basis of a comparison of the description given by Linnaeus (of which he had obtained a translation from the Professor of Latin at Liverpool University) with actual specimens of *Culex caspius* Pallas. The repetition of this comparison recently carried out by Mattingly both confirms the arguments advanced by Patton and in addition has disclosed further features in Linnaeus' description which strongly reinforce Patton's conclusions. A comparison of that description with specimens of *Culex caspius* Pallas either with the naked eye or with a lens of low magnification shows that the correspondence between the two is not only good but actually very striking. So much so that no trained taxonomist with a working knowledge of Latin could hold in his hand a specimen of the pale Egyptian form of Pallas's species and doubt for a moment that it was the species on which Linnaeus based his description of *Culex aegypti*.

7. We have already explained (paragraph 5) that the substitution for *aegypti* Linnaeus of some other specific name would cause such serious and widespread confusion that it could not possibly be contemplated and that what is required is some action by the Commission which will securely link the specific name *aegypti* Linnaeus to the Yellow Fever Mosquito. We have considered what form that action might most conveniently take and are of the opinion that the best course would be to follow the precedent established in the case of the name *Coluber sirtalis* Linnaeus in which the Commission used its plenary powers to approve a neotype consisting of a species different from that to which Linnaeus had applied the name *sirtalis* (1956, Opinion 385, *Ops. Decl. int. Comm. zool. Nomencl.* 12 : 193). The two cases are almost exactly similar and we feel that the justification for such use of the plenary powers is even greater in the present instance owing to the medical importance of the species concerned and the very widespread use of the name *aegypti* in the general literature. We propose and have chosen as neotype a female, with associated larval and pupal exuvia, which is described and figured in Annex I to the present application.

8. In choosing a specimen to serve as the neotype of *Culex aegypti* we have not felt compelled to restrict ourselves to Egyptian material. It is true that the Yellow Fever Mosquito has been known to occur in Egypt but this is a marginal part of its range and it is improbable that it has ever been abundant there. It is now believed to have been totally eradicated from Egypt so that, were an Egyptian neotype to be chosen, fresh topotypical material would no longer be available. Nor are suitable specimens available either in the British Museum or in the U.S. National Museum. In view of the large amount of genetical work currently being carried out on this species it has been felt desirable to choose a specimen representing approximately the mean of the range of variation. The present specimen has the additional advantage that it is accompanied by more than 150 other offspring from the same mother, with associated exuvia.

9. The name "*Stegomyia*" was first published by Howard in his book "Mosquitoes" (New York, June, 1901). It is first employed in the legend to a figure, by Howard, of the adult female of the Yellow Fever Mosquito,

"*Stegomyia fasciata*" (a junior subjective synonym of *Culex aegypti* Linnaeus as required to be validated under Section 1 above). (Fig. 31, p. 127). Subsequently (pp. 134, 155) Howard makes it clear that the name *Stegomyia* was devised by Theobald and on p. 234 he says "It will be noticed . . . that Mr. Coquillett and the writer have adopted the generic name *Stegomyia* for the mosquito which has in our previous writings been named *Culex fasciatus*. I have been induced to adopt this name through correspondence with Mr. Theobald, . . . It will be unfortunate should this use of the name antedate the publication of Mr. Theobald's monograph, since the genus should be his not ours". There follows (p. 235) a generic synopsis including characters for the recognition of *Stegomyia* devised by Coquillett. Theobald himself published the name *Stegomyia* for the first time in July 1901 (*J. trop. Med. Hyg.* 4 : 235), together with a generic diagnosis. All subsequent authors have credited the name to Theobald. Howard included only two species in *Stegomyia*, viz. *Stegomyia signifera* Coquillett (now customarily placed in the genus *Orthopodomyia*) and *St. fasciata*. Theobald does not list any included species in his paper of July, 1901, but he included *St. fasciata*, together with a number of other species, in a further discussion of *Stegomyia*, published in September, 1901 (*Mem. Liverpool Sch. trop. Med.* 4 : Appendix, p. iii) and also in his "Monograph of the Culicidae or Mosquitoes" (Vol. I, p. 283, November, 1901). *St. fasciata* was first formally designated as the type-species of *Stegomyia* by Neveu-Lemaire (*Mém. Soc. zool. Fr.* 15 : 212, 1902) and it has been universally accepted as such ever since. It is therefore requested that the generic name *Stegomyia* Theobald (1901, in Howard, *Mosquitoes* : 235) should be placed on the Official List of Generic Names in Zoology at the same time that the specific name *aegypti* Linnaeus, 1762, as published in the combination *Culex aegypti* and validated under the plenary powers as recommended in paragraph 4 above, is placed on the Official List of Specific Names in Zoology. The entry so to be made should be endorsed also to show that by a direction given under the plenary powers the nominal species so named is to be interpreted in the manner recommended in paragraph 7 above. Finally, under the Completeness-of-Opinions Rule the specific name *caspicus* Pallas, 1771, as published in the combination *Culex caspicus*, should, as a valid name for a species entering into the present case, also be entered on the above Official List.

10. No family-group name problem arises in the present case, the species concerned being currently placed in the family CULICIDAE.

11. For the reasons set out above, we ask the International Commission on Zoological Nomenclature :

(1) to use its plenary powers :

- (a) to validate the specific name *aegypti* Linnaeus, 1762, as published in the combination *Culex aegypti* ;
- (b) to direct that the nominal *Culex aegypti* Linnaeus, 1762, validated as recommended in (a) above, be interpreted by reference to the specimen described and figured in Annex I to the present application ;

(2) to place the under-mentioned specific names on the Official List of Specific Names in Zoology :

- (a) *aegypti* Linnaeus, 1762, as published in the combination *Culex aegypti* and as validated under the plenary powers in (1)(a) above, the entry so to be made to bear an endorsement that the nominal species so named is to be interpreted in the manner directed under the plenary powers in (1)(b) above;
 - (b) *caspicus* Pallas, 1771, as published in the combination *Culex caspicus*;
 - (3) to place the under-mentioned generic name on the Official List of Generic Names in Zoology:
- Stegomyia* Theobald, 1901 (gender : feminine) (type-species by selection by Neveu-Lemaire, 1902; *Culex fasciatus* Fabricius, 1805 [Note not for inclusion in the Official List : The name *Culex fasciatus* Fabricius, 1805, is a junior subjective synonym of *Culex aegypti* Linnaeus, 1762, as validated and interpreted under the plenary powers in (1) above].

A N N E X E I

Description of Neotype of "*Aedes aegypti*" Linnaeus, 1762, the Yellow Fever Mosquito.

Description: An adult female with wing length 3 mm. Proboscis entirely dark, about equal in length to fore femur. Palps a little more than one-fifth as long as proboscis, with the apical segment white-scaled above. Tori with patches of silvery white scales on inner and outer surfaces. Clypeus with lateral patches of similar scales. Eyes well separated behind. Occiput with median longitudinal stripe of broad, flat, white scales continued forward between eyes. Eye margins with narrow line of very small silvery white scales. To either side of median white occipital stripe an area of pale brownish scales. Outside this an area of blackish scales and outside this again a line of silvery white scales followed by an area of blackish scales and, finally, towards the under surface a patch of whitish scales. All decumbent scales of vertex and occiput broad and flat except for the small, narrow scales round the eye margins. Upright forked scales pale brown, restricted to nape. Pronotal lobes widely separated with broad silvery white scales. Scutum with narrow dark brown scales over most of the surface. Anterior border with a line of narrow white scales interrupted in the mid line by a distinct apical spot of similar scales, elongated in the anteroposterior direction. On the anterior half of the scutum, just inside the lateral borders, a pair of narrow, crescentic patches of broad silvery white scales. These crescentic patches continued backwards to the posterior border as two narrow, submedian, longitudinal lines of white scales. Inside these, on each side, a longitudinal line of very narrow yellow scales continuing backwards on either side of the mid-line from just behind the median anterior white spot to a short distance in front of the pre-scutellar bare space. The latter bordered at the sides by a few narrow whitish scales

and with a small patch of similar scales at its anterior edge. Small patches of narrow whitish scales present above wing roots. Scutellum with all scales broad, flat and silvery white except for some broad, dark scales at apex of mid-lobe. Postnotum bare. Posterior pronotum with flat, white scales below and some narrow, dark brown scales above. White scales present on paratergite, hypostigmal areas, upper and lower sternopleuron and sternopleural knob and upper and lower mesepimeron. Postspiracular area bare. All coxae with conspicuous patches of white scales. Fore femur with anterior surface extensively pale on basal half, pale below nearly to tip. Mid femur with anterior surface wholly pale for a short distance at base and with a narrow but conspicuous white line nearly to tip. Anterior surface of hind femur entirely pale on about the basal two-thirds, pale above nearly to tip. Fore femur with posterior surface much like anterior. Mid femur with posterior surface mainly pale, dark above towards tip. Hind femur pale behind on about the basal two-thirds. Tibiae dark. First two fore and mid tarsals narrowly pale at base. Remainder dark. First three hind tarsals narrowly pale at base, fourth pale except narrowly at tip, fifth entirely pale. Fore and mid claws toothed. Hind claws simple. Wings dark except for a small white spot at base of costa. Wing scales narrow. Anterior fork cell a little less than twice as long as its stem. Squama with relatively short hairs or hairlike scales. Alula with mixed narrow and moderately broad scales confined to border, without decumbent scales. First abdominal tergite with an extensive median patch of pale scales. Tergites II-VII with narrow basal white bands and a single row of small white scales along posterior border. Paired silvery white lateral patches present on these tergites but clearly visible from above only on tergite VII. Anterior sternites largely pale, the more posterior ones with an increasing number of dark scales. VI with a median, apical pale patch separated from the basal pale area by a dark band curving inwards from the apicolateral corners. VII almost entirely dark except for the extreme posterior edge and two small sublateral pale spots a little anterior to this.

The fourth stage larval and pupal exuviae of the neotype are figured in detail in Figs. 2, 3, 4 and 5, pp. 215-219.

2. *Locality of Neotype* : Kuala Lumpur, Selangor, Malaya, September 1957, W. W. Macdonald. The neotype was reared in the laboratory of the Institute for Medical Research in Kuala Lumpur from eggs laid by a wild-caught mother. The mother laid three successive egg batches and she and 170 brothers and sisters of the neotype are available as paratype material. 107 of the brothers and sisters have individually associated larval and pupal skins. Part of the remaining skins have been preserved in bulk. The mother was not mated in the laboratory. On the evidence at present available it would not, however, be prudent to rule out the possibility of multiple fertilization and, therefore, of a mixed paternal ancestry.

3. *Reference number allotted to Neotype* : The neotype bears the reference number 0325B/14, which was allotted to it in the laboratory in Kuala Lumpur. The number 0325 is that of the mother. The letter B implies that the neotype was reared from the second egg batch. The number 14 is that of the individual specimen. The whole of the type material is at present in the British Museum

(Natural History). Paratypes will be presented to the U.S. National Museum. Other museums will receive paratypes on request.

4. *Figures of Neotype*: *Bulletin of Zoological Nomenclature* 19 : Plate 5, Figs. 1, 2, 3, 4, 5.

FIGURES

Culex aegypti Linnaeus, 1762

Neotype designated by P. F. Mattingly, Alan Stone and Kenneth L. Knight in the Annex to Application Z.N.(S.) 1216. Reared in laboratory of Institute for Medical Research, Kuala Lumpur. Adult female. Wing length 3 mm. With associated larval and pupal exuviae.

Plate I. Adult. *a*, head and thorax in dorsal view ; *b*, abdomen in dorsal view.

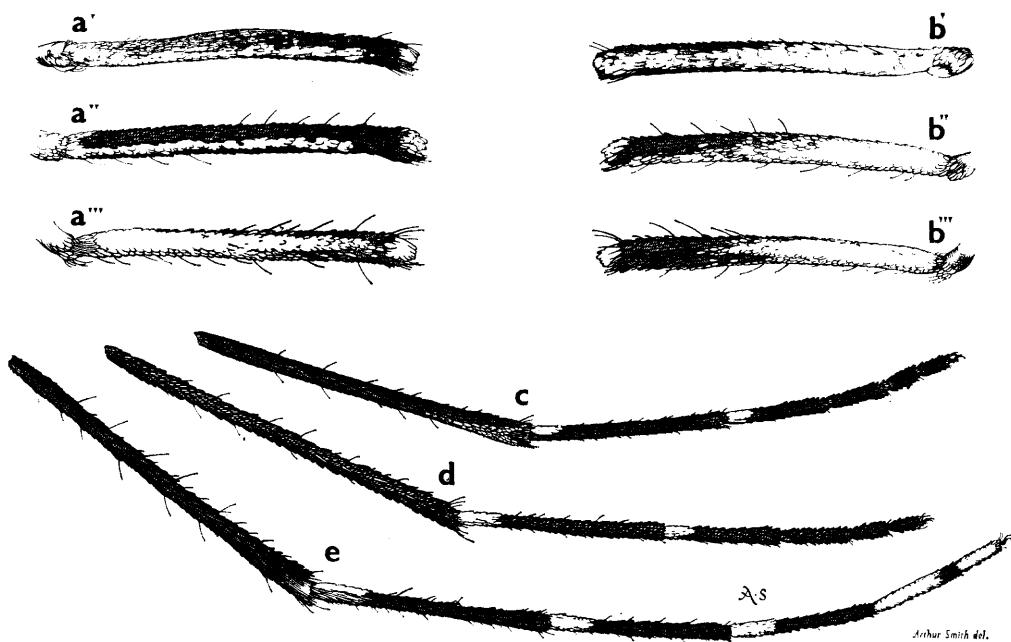


Fig. 1. Adult. a' , a'' , a''' , fore, mid and hind femur, respectively, in anterior view; b' , b'' , b''' , the same in posterior view; c , d , e , fore, mid and hind tibiae and tarsi in anterior view.

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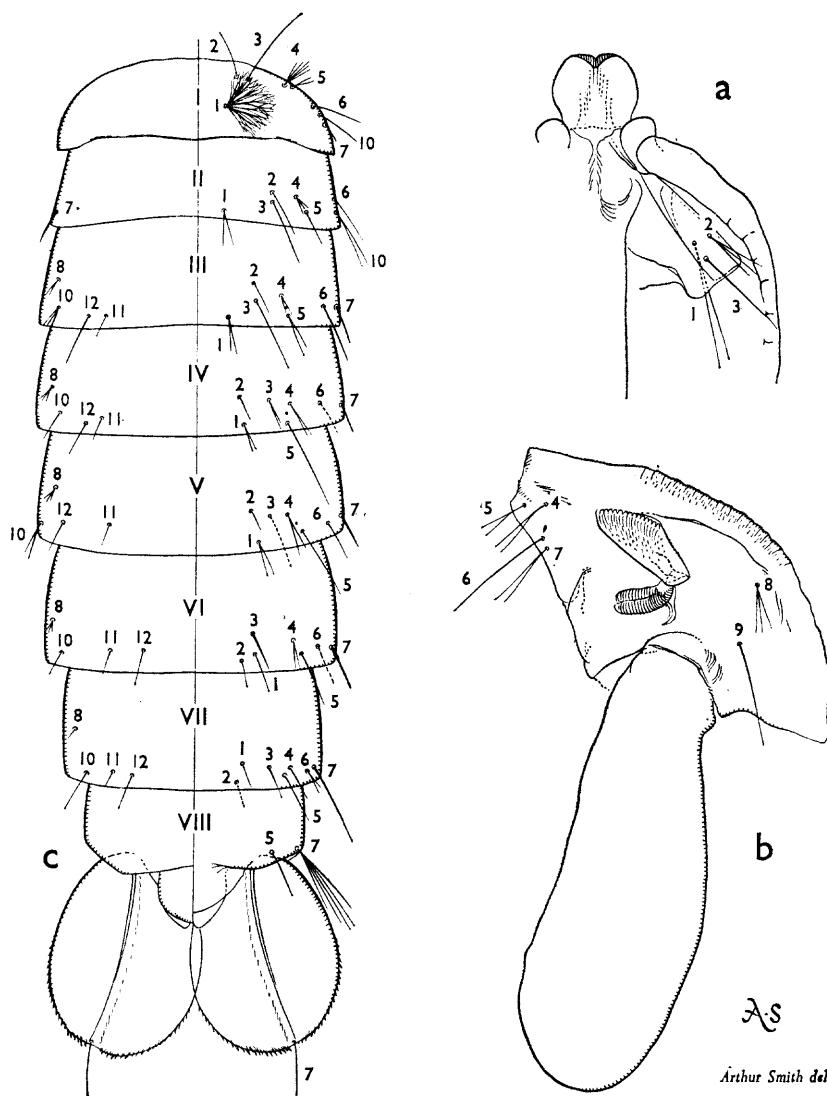


Fig. 2. Pupa. *a*, *b*, cephalothorax from exterior; *c*, abdomen in dorsal view on right and ventral view on left. Setae numbered according to the system of Belkin (1953, *Proc. ent. Soc. Wash.* 55 : 318).

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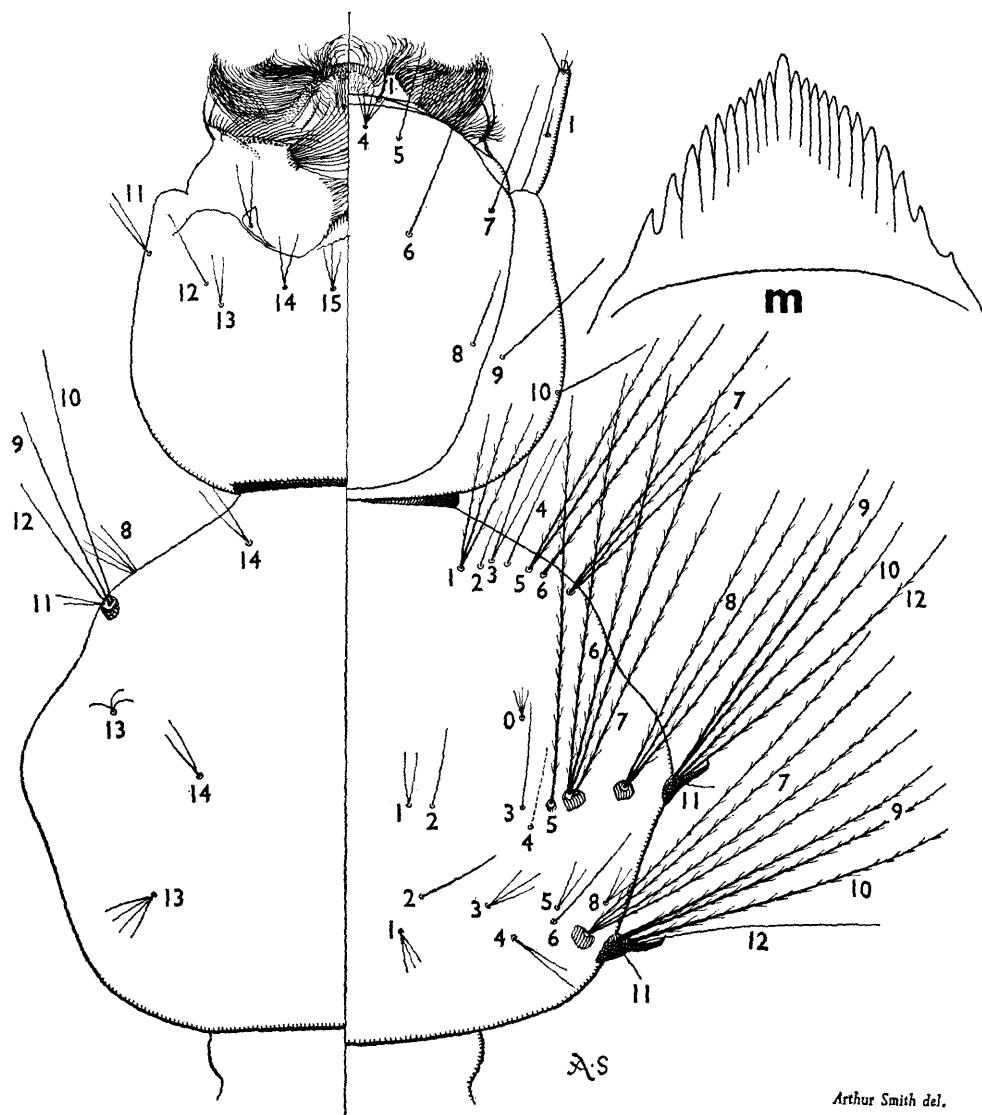


Fig. 3. Larva. Head and thorax in dorsal view on right and ventral view on left. Setae numbered as in Fig. 3. *m*, mentum.

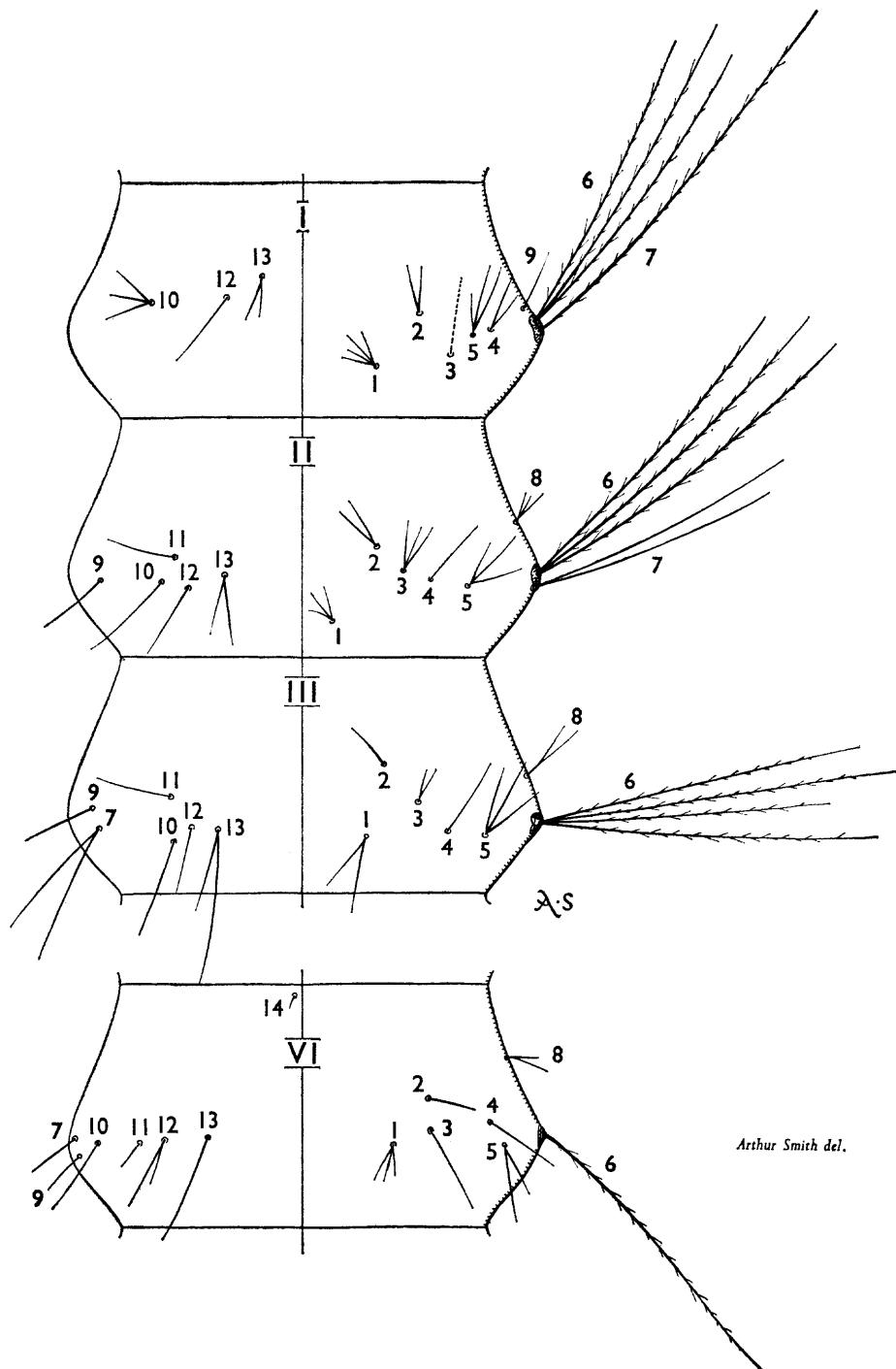


Fig. 4. Larva. Abdomen in dorsal view on right and ventral view on left.

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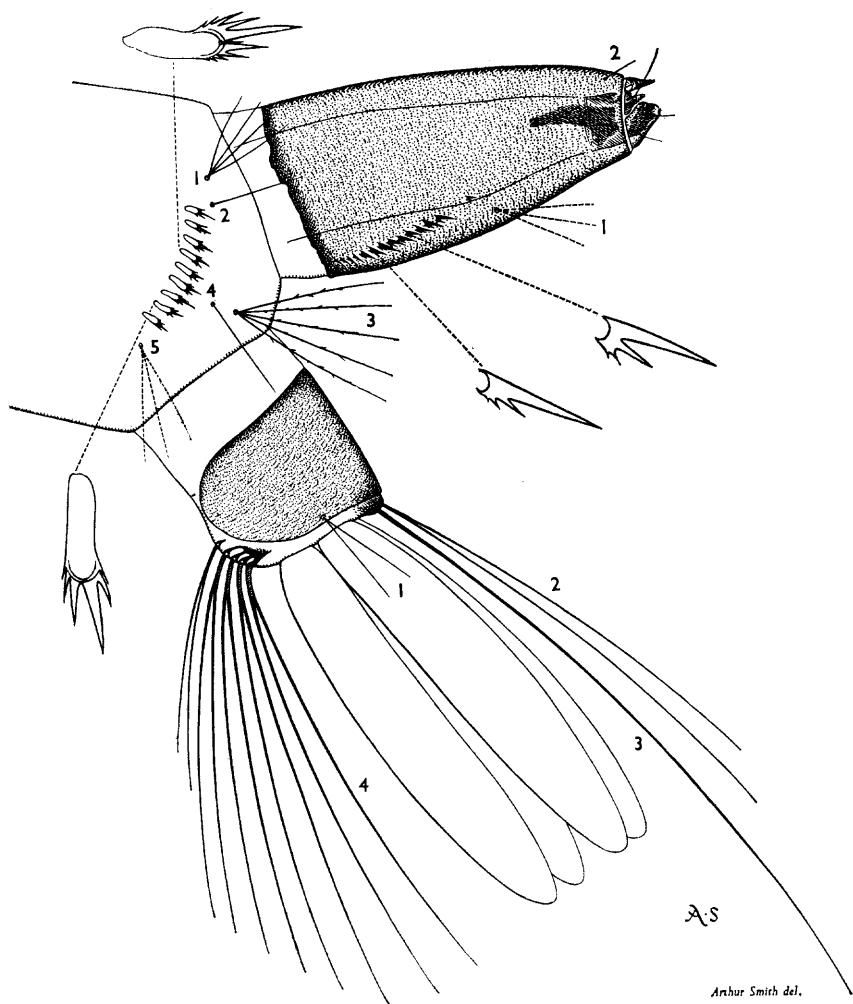
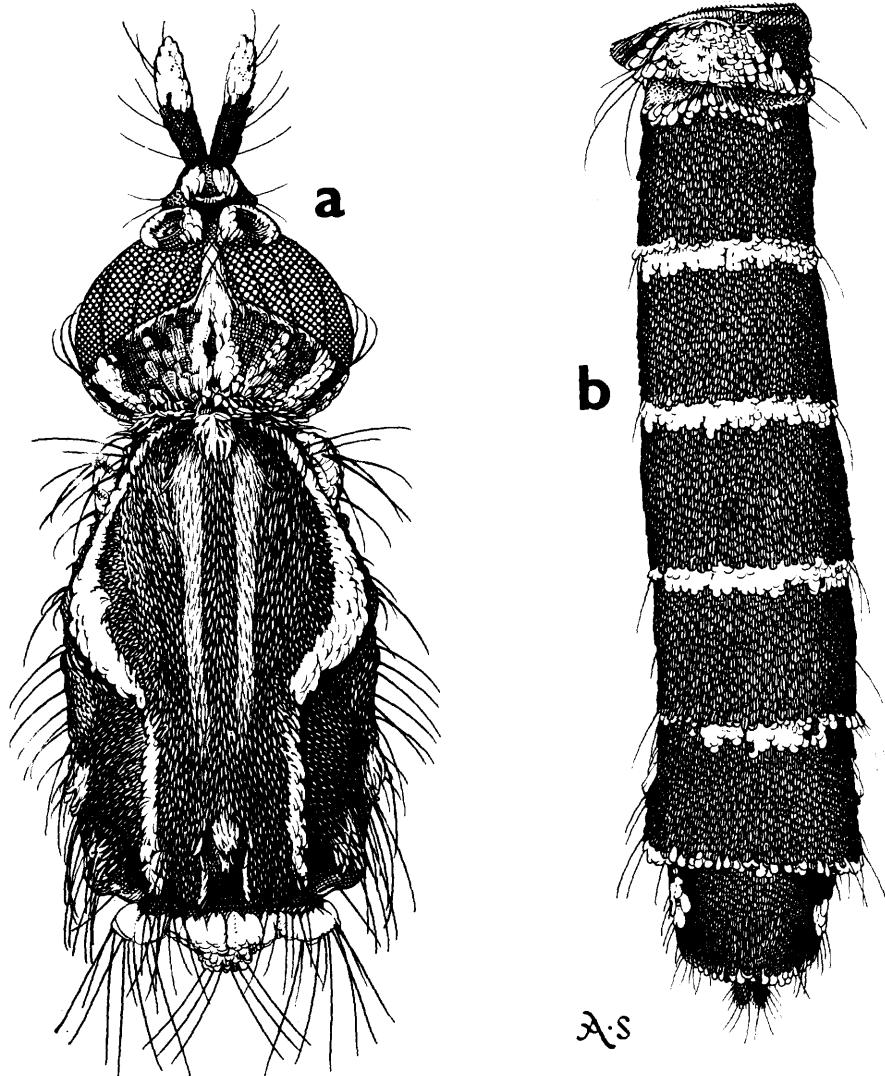


Fig. 5. Larva. Terminal segments.



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